Is the audit services market competitive following Arthur Andersen's collapse?*

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Is the audit services market competitive following Arthur Andersen's collapse?

Abstract

A significant body of empirical-based research into audit pricing has laid claim to the existence of additional audit value being delivered by brand name (Big n) auditors over non-brand name auditors and that the audit market has remained competitive during the last two decades. The recent demise of Arthur Andersen leaving the Big 4 dominating the large client market calls into question whether audit markets continue to be competitive. Moreover, audit fee estimation models used to infer the existence of brand name premiums and test the competitiveness of audit markets have typically assumed that auditors are randomly allocated to client companies - this allows the Big n variable to be exogenous in the audit fee regression estimation. Recent studies question whether companies self-select their auditors which could induce a self-selection bias in the audit fee regression estimations and impact fee premiums estimates used to assess competitiveness in audit markets.

This study investigates whether audit markets remain competitive in the wake of Andersen's demise while controlling for potential self-selection bias in reported model estimations of audit fee premiums for Big 4 public company auditors. We conduct the study on Australian audit market data for the latest available year 2003 following the emergence of the Big 4. We find audit markets inhabited by the Big 4 remain competitive. We also find, in contrast to Chaney et al.'s (2004) results with UK private company audits and Chaney et. al.'s (2005) results with US public company audits, but consistent with that Ireland and Lennox (2002) finding for UK public company audits, that there is no evidence of a self-selection bias affecting the inference that Big 4 auditors earn audit fee premiums. This suggests there are important differences in the audit pricing mechanisms operating between private and public company audit markets and/or across countries.

Key words: Audit fees, market competition, self-selection bias, Andersen's demise

1. Introduction

Prior audit pricing research has laid claim to the existence of competitive audit markets with differential audit quality being delivered by brand name auditors over non-brand name auditors. They have exclusively adopted a variant of Simunic's (1980) audit fee regression including an auditor size dummy variable to infer the existence of brand name premiums and the absence of cartel pricing.[1]

In this paper we reports the results of a study of audit market competitiveness using an audit pricing framework conducted on post Andersen demise audit fee data for the Big 4 in 2003 in Australia. In the last two decades, international audit markets have experienced a series of significant structural changes through auditor mergers.[2] In one of the most recent and highly controversial structural change, the audit firm Arthur Andersen shed clients and staff in dramatic fashion in a relatively sort period of time. In Australia, around 75% of Andersen's clients moved to Ernst and Young along with the majority of the audit partners which was in effect classified as a merger of the two audit firms by the Australian Competition and Consumer Commission (ACCC), charged with the statutory responsibility of assessing merger effects on competition under the Trade Practices Act 1974. In contrast, in the United States, the distribution of Andersen clients has been more uniform (Scott 2003). The increased supplier concentration in Australia, together with the Big 4 auditors appearing to concentrate more on servicing large clients,[3] raised a priori concerns of a lessening of competition in the Australian audit market which were manifest in commentary and public policy debates over the competitiveness of audit markets.[4] This public policy debate over competitiveness has been echoed internationally in other jurisdictions.[5]

Consistent with the public policy debate in Australia, the ACCC agreed that the merger raised

[1] Relevant studies that investigate auditor size and audit fees include Simunic (1980), Francis (1984) and Francis and Stokes (1986), Palmrose (1986), Francis and Simon (1987). For a review of audit pricing studies in countries other than the U.S., refer to Walker and Johnson (1996).

[2] Peat Marwick merged with KMG Thompson McLintock and formed KPMG in 1986. Ernst and Whiney and Arthur Young merged in 1989 formed Ernst and Young. In 1990, Deloitte, Haskins and Sells merged with Touche Ross formed Deloitte Touche. The merger between Price Waterhouse and Coopers and Lybrand in 1997 formed PricewaterhouseCoopers.

[3] Refer to Table 1 which we discuss in more detail below.

[4] See for example articles in the Australian press: Boreham (2002) "Audits all the rage"; Australian Financial Review Editorial (April 2002) "Fat Four Would Weaken Audits", Robertson (2002) "How Four May Become Three or Even Two".

[5] See for example the following headlines which have persisted in recent times: "Andersen's plight saddles business with monopoly", *The Times*, 5 April 2002; "Big four auditors face competition inquiry", *The Guardian,* 3 July 2002; "For and Against – Breaking the monopoly", *Accountancy Age*, 29 August 2002; "Big Four's dominance shows no let up amid calls for scrutiny", *Financial Times,* 6 January 2004; "Big four auditor too powerful, says EU: Accountancy firms could face action to end dominance", *The Guardian,* 17 December 2004.

concerns for competition in the audit market. However, the Commission's view was that their concentration thresholds would not be crossed in this market and they accordingly did not oppose the merger (ACCC, 2002). With this background, in this study we investigate whether subsequent to the merger any evidence of monopoly pricing emerged in the Australian audit market. Because increased supplier concentration by itself is insufficient evidence of collusive pricing arrangements (Simunic 1980) and concentration measures and thresholds are somewhat arbitrary, [6] we adopt Simunic's (1980) audit-pricing framework with the segmentation assumption (small and large client segments categorizing by auditee size) to investigate audit market competition.

Recent studies using audit pricing models have questioned whether companies self-select their auditors which could induce a self-selection bias in the audit fee regression estimations and impact audit fee premiums estimates used as the basis for drawing inferences about market competition. We take into account the findings of such studies by Ireland and Lennox (2002), Chaney et al. (2004) and Chaney et al. (2005) that argue auditor choice is likely to be endogenous, and it is probable that clients self-select their incumbent auditors based upon firm characteristics, private information, or other unobservable characteristics. Therefore, inclusion of an auditor indicator variable in an audit fee regression could be invalid because client firms are not randomly assigned to their audit firms.

Chaney et al. (2004) provide evidence of self-selection bias in private company audits in the UK while allowing for pricing differentials between large and small auditors to be reflected in slope coefficients as well as intercepts in audit fee regression estimations. Their results suggest that private companies do not view brand name auditors as superior enough to justify a fee premium. By contrast, Ireland and Lennox (2002) find that after controlling for self-selection bias in public company audits in the UK (focusing on regression intercepts only) that the Big 5 audit fee premium is greater than that revealed by prior research. More recently Chaney et. al. (2005) find Big 5 audit fee premiums do not exist for US public listed audits after controlling for self-selection and nonlinearities in client size. We reconcile these three studies by applying the Heckman self-selection analysis deployed in Chaney et al. (2004), (2005) as well as examining the non-linearity issue with the public company audit market in Australia, thereby examining the generalisability of their findings across countries and markets.

We find some evidence of self-selection bias in the Australian audit market but it does not

[6] The market concentration measures and thresholds differ across jurisdictions - for details see ACCC's Australian Merger Guidelines, June 1999 (Endnotes 66, p.81).

explain the conventional finding of audit fee premiums charged by large auditors. We document different audit pricing structures for Big 4 and non-Big 4 auditors with evidence of variations in slope coefficients and intercepts for audit fee regressions across these auditor classifications. When we further investigate audit firm pricing behaviors in the large and small client segments respectively, we cannot find any evidence of a self-selection bias affecting the inference that Big 4 auditors earn audit fee premiums. Furthermore, the audit fee regressions for different audit groups do not appear to be systematically different from each other in the large client segment whereas the slope coefficients still vary between the Big 4 and non-Big 4 audit fee equations in the small client segment. We provide evidence of Big 4 audit fee premiums in both small and large auditee segments although these disappear in the extremely large (Top 300) client segment consistent with Francis and Stokes (1986) and Carson et. al., (2004). We don't find evidence to support other tests for size nonlinearities.

Overall, our results support the conclusion that perfect competition still prevails in the Australian audit services market following Andersen's demise. In contrast to Chaney et al.'s (2004) results with UK private company audits and their (2005) results with US public companies, but consistent with the Ireland and Lennox (2002) finding for UK public company audits, we conclude there is no evidence of a self-selection bias affecting the inference that brand name auditors are superior suppliers of audit quality. This suggests that there are important differences in the audit pricing mechanisms operating between private and public company audit markets and/or across countries.

The remainder of the paper is organized as follows. Section 2 reviews the prior research for audit market competition and related audit fee literature including self-selection studies. We also revisit and adapt Simunic's (1980) pricing framework in this section. Specifications for the Heckman selection model are presented in Section 3. Section 4 describes the data and results. Section 5 concludes the paper.

2. Prior Research

2.1 Audit services market competition

The audit services market is dominated by a few large audit firms. Our data (discussed later in Table 1) show that Big 4 audit firms service approximately 60% of the companies listed on the Australian stock exchange (ASX) in 2003 and capture approximately 90% of the audit fee revenue paid by those companies. Market dominance by Big 4 (previously 5, 6, 8) audit firms

is also documented across other countries and time periods.[7] To investigate concerns that market dominance means that the large audit firms are not competitive, Simunic (1980) created a pricing framework to compare large and small auditor pricing behaviors across different client size market segments. We apply this framework to this study.

Simunic (1980) constructs an economic model to test the effects of market structure upon the pricing of audit services and to investigate the audit fee determinants. He relates audit fees to potential third party losses, and the relative costs of utilising audit services (Yardley et al. 1992). He assumes small auditees are in a competitive audit services market because they are serviced by a large number of auditors. The large auditee segment of the market is dominated by the Big n, and is potentially less competitive. The small market segment is set as a competitive benchmark, and the competition test is approached as a comparison of prices within the different client segments.[8] His results suggest that there is no significant difference between large and small audit firm pricing, and he could not reject the hypothesis that perfect competition prevails throughout the market. Rather, the evidence shows that large auditors enjoy scale economies in the large client segment.

Francis (1984) replicates the competition research in Australia with a different set of control variables. He concludes that Big 8 prices are higher in both large and small auditee market segments, which implies that the audit services market is competitive and there is Big 8 product differentiation. Francis and Stokes (1986) argue that the conflicting conclusions of Simunic (1980) and Francis (1984) can be explained by the contrastable clientele size classifications in the previous two studies. By selecting two extreme categories, they compare the extremely large and extremely small segments of the Australian market and find evidence for Big 8 price premiums for small auditees but not for large auditees. Their results suggest Big 8 accounting firm product differentiation across all client sizes and diseconomies of scale to the non-Big 8 in the audits of large companies.

The price competition assumption has been widely adopted by most of the subsequent research, and the Big 8 fee premium has been interpreted as evidence of Big 8 product

[7] For evidence of Big 4 (5, 6, 8) market shares and audit pricing in different countries refer to: U.S. market (eg. Simunic 1980; Palmrose 1986; Francis and Simon 1987), Australia (Francis 1984; Francis and Stokes 1986; Carson et al. 2004), U.K (Chen et al. 1993; Brinn et al. 1994; Ireland and Lennox 2002; Chaney et al. 2004), India (Simon et al. 1986), Hong Kong, Malaysia and Singapore (Low et al. 1990; Simon et al. 1992; Lee 1996; Gul 1999), New Zealand (Firth 1985; Johnson et al. 1995), Canada (Anderson and Zeghal 1994; Chung and Lindsay 1998), Japan (Taylor 1997), Pakistan (Simon and Taylor 1997), South Korea (Taylor et al. 1999), Bangladesh (Karim and Moizer 1996), Finland (Niemi 2002) and Nigeria (Taylor and Simon 2003).

[8] A review of Simunic's (1980) pricing framework is presented in more detail in Exhibit 1 below.

differentiation. However, few studies adopt the same basic form as Simunic's model (Walker and Johnson 1996), and his segmented audit market assumption has received little recent attention (Carson et al. 2004). Carson et al. (2004) is the most recent study that re-examines the competition issue with Australian data from 1995 to 1999 which is well before Andersen's demise. Their findings suggest a similar conclusion to the previous literature that higher fees are charged by large auditors in the small client segment and no fee premium is found in the large client segment.

2.2 Self-selection bias effect on audit fee premiums

Audit fee models used in competition research typically include an exogenous dummy to capture the effects of Big 4 premiums. Such models implicitly assume random assignment of clients to auditors (Ireland and Lennox 2002). This assumption introduces a potential self-selection bias because whilst the audit fees are observable after companies chose their auditors, we do not observe the fees that would have been charged if alternative choices were made. Ireland and Lennox (2002) use a two-stage approach, where audit firm selection is modeled in the first stage, and audit fees given audit firm selection are modeled in the second stage. Their results from the UK public company market indicate that the effects of auditor selection bias on audit fees are economically and statistically significant, and the premium earned by large audit firms (measured by the intercept difference between Big 5 and non-Big 5 audit fee equations) is more than twice as large when selectivity bias is taken into account. Their results support the suggestion that client self-selection significantly understates the audit fee premium estimation.

Chaney et al. (2004) also use a two-stage self-selection model and show that in the UK private company market self-selection bias affects the OLS audit fee regression. However, they show that there is no Big 5 audit fee premium after controlling for the self-selection bias. They consider both differences in slope and intercept coefficients because they argue that audit firms structure their businesses in a manner appropriate for specific client segments, affecting the relation between each client characteristic and audit fees across different auditor types. In addition, by estimating the difference between the actual audit fees paid and the fee that the firm would have paid with the estimation of counterfactuals, the outcome suggests that clients self-select fee minimizing audit firms.

The different conclusions in Ireland and Lennox (2002) and Chaney et al. (2004) could be attributed to the differences in the audit pricing mechanisms operating between private and public company audit markets. However, in a recent study on 2001 data by Chaney et al., (2005) on US public companies, evidence is provided suggesting US firms do not pay a Big 5

audit fee premium once self- selection bias and nonlinearities in client size[9] are controlled for in the fee estimation models. We reconcile these three studies by applying the Heckman self-selection analysis deployed in Chaney et al. (2004) to the public company audit market in Australia thereby examining the generalisability of their findings across countries and markets using more recent data post Andersen's demise. The model specification is provided in Section 3.

2.3 Pricing framework specification

The prior studies suggest that the small client segment of the audit services market is more competitive than the large client segment. Table 1 presents descriptive data for the audit services market from 1998 to 2003. Panel A shows that the market share for the Big 4 (5, 6, 8) from 1998 to 2003 does not change overall.

(Insert Table 1 here)

Panel B shows the Big 4 market shares for the same period classified by auditee size. It shows that there is greater competition in the small client segment while in the larger client market segments the Big n auditors have increased their market share over the period. These market share statistics, prima facie, signal increased scope for cartel pricing arrangements in the market for audit services over this period. To investigate this issue using the small client market as a competitive benchmark, we adapt Simunic's (1980) pricing framework for investigating Big 4 audit pricing. Exhibit 1 presents the framework with an explanation of the possible scenarios provided beneath the table.

(Insert Exhibit 1 here)

The framework allows the pricing behavior of Big 4 and non-Big 4 auditors in the large auditee segment to be compared with their pricing behavior in the benchmark small auditee segment. Big 4 cartel pricing is found where Big 4 auditors charge higher fees than non-Big 4 auditors in the large client market segment but not in the small segment. However, audit services differentiation offered by Big 4 accounting firms as well as confounding Big 4 economies of scale or non-Big 4 diseconomies of scale create complicated outcomes and result in the different scenarios listed in Exhibit 1.

[9] Chaney et al. (2005) develop a number of theoretical arguments for how client size could affect audit fees. The implied design goes beyond estimating the models on sample based on client size segments (Francis and Stokes, 1986 and Carson et.al. 2004) and using size dummy interactions with the auditor indicator variable (Carson et. al. 2004). We report the results of applying their design to our data in section 4.5.

Simunic (1980) characterizes the audit services market as a hedonic market where product differentiation is revealed by differences in pricing associated with differences in specific suppliers' characteristics. Big 4 firms, as a group, are likely to enjoy name recognition and provide high quality services which may command a positive implicit price. Therefore, consistent higher fees charged by Big 4 accounting firms, which does not vary with the size of auditees, could be interpreted as Big 4 product differentiation. On the other hand, large audit firms could also realise scale economies sourcing from their size advantages such as substantial staff knowledge, specialisation, experience and economies in staff training, or economies in multiple office locations. These could result in a greater efficiency in the auditing process and a reduction of overall audit costs. Thus, Big 4 economies of scale could be captured in the pricing framework with consistently lower Big 4 audit fees across different client segments. However, lower Big 4 audit fees in one single segment is characterized as diseconomies of scale to non-Big 4 firms because the scale economies should be broadly applicable to all production throughout the whole market (Francis and Stokes 1986). Therefore, lower Big 4 audit fees in the large or small segment demonstrates the diseconomies to smaller auditors in providing their audit services to larger or smaller clients.

We make inferences about audit market competition based on the correspondence between evidence of differences between Big 4 and non-Big 4 pricing in small and large client segments after using the Heckman selection procedure to control for potential self-selection bias in the audit fee model.

3. Research Design

3.1 Models

Chaney et al (2004) explain the effect of auditor self-selection on the audit fee model. The auditor selection equation could be written as:

$$Big_i = \gamma_0 + \gamma_1 Y_i + u_i \quad (1)$$

and the corresponding audit fee equations could be written as:

$$AF_{1i} = \beta_{10} + \beta_{11} X_i + e_{1i} \quad \text{if } Big_i = 1 \quad (2)$$

$$AF_{0i} = \beta_{00} + \beta_{01} X_i + e_{0i} \quad \text{if } Big_i = 0 \quad (3)$$

where, AF_i is the audit fee; Big_i is the dummy variable that takes the value 1 if the auditor is Big 4, and 0 otherwise. X_i and Y_i are the explanatory variables. e_{1i}, e_{0i} and u_i are the error terms. The Heckman selection procedure first uses the auditor choice equation, Eq (1), to calculate the Inverse Mills Ratios (IMR). Then, the IMR are included as independent variables in the audit fee models, Eq (2) and (3), respectively to allow for any self-selection

bias arising from the auditor selection.

Chaney et al (2004) argue that it is appropriate to use a subset of variables from the audit fee model to design the audit choice equation. Because the IMR is a non-linear function of the variables included in the first-stage probit model, then the second-stage equation satisfies the identification requirement (because of this non-linearity) even if the other control variables in both equations are identical (Willis and Rosen 1979).

Chaney et al (2004) use models developed for the UK private company audit services market. Our sample is drawn from Australian publicly listed companies and we draw upon prior Australian audit fee research to develop our models. The audit fee model here is similar to that used by Francis (1984), Francis and Stokes (1986), Ferguson and Stokes (2002), and Ferguson et al. (2003). Our auditor choice model is restricted to a subset of the variables in the audit fee model discussed below together with an asset characteristics variable suggested by the prior work from Godfrey and Hamilton (2005) and Francis et al (1999).

Big 4 choice model:

$$\text{Big 4} = \alpha_1+\alpha_2\text{LnTA}+\alpha_3\text{LnSub}+\alpha_4\text{DE}+\alpha_5\text{Quick}+\alpha_6\text{Foreign} +\alpha_7\text{CATA}+\alpha_8\text{ROI}+\alpha_9\text{Loss}+\alpha_{10}\text{Intangible}+u \quad (4)$$

Audit fee model:

$$\text{LnAF}=\beta_1+\beta_2\text{LnTA}+\beta_3\text{LnSub}+\beta_4\text{DE}+\beta_5\text{Quick}+\beta_6\text{Foreign} +\beta_7\text{CATA}+\beta_8\text{ROI}+\beta_9\text{Loss}+ \beta_{10}\text{Opinion}+\beta_{11}\text{YE}+\beta_{12}\text{Intangible}+\beta_{13}\lambda+\varepsilon \quad (5)$$

The variables along with their expected signs for the auditor choice and audit fee models respectively are defined as follows:

Big 4		= 1 if audit firm is a Big 4 accounting firm, 0 for otherwise,
LnAF		= natural log of audit fees,
LnTA	+ +	= natural log of the clients' total assets at year end,
LnSub	+ +	= natural log of the number of the clients' audited subsidiaries,
DE	+ +	= ratio of clients' long-term debt to total assets at year end,
Quick	- -	= ratio of clients' current assets (less inventories) to current liabilities,
Foreign	+ +	= proportion of the clients' subsidiaries that are foreign,
CATA	+ +	= ratio of clients' current assets to total assets at year end,
ROI	+ ?	= ratio of clients' earnings before taxes to total assets,

Loss	? ?	= 1 for loss in any of the past three years; 0 for otherwise,
Opinion	NA +	= 1 for qualified opinion; 0 for otherwise,
YE	NA -	= 1 for non-June 30th year end; 0 for otherwise,
Intangible	? +	= ratio of intangible assets to total assets,
λ	NA ?	= Inverse Mills Ratios (obtained from Big 4 auditor choice model calculation) one each for the audit fee model for clients audited by the Big 4 and for the audit fee model for those audited by the non-Big 4
ε, u		= error terms

We expect that the likelihood of Big 4 engagement will increase as auditee size and complexity increase. Prior literature consistently shows a positive association between size and Big 4 auditor choice (e.g. Palmrose 1984; Simunic and Stein 1987; Francis and Wilson 1988; Francis et al 1999; Godfrey and Hamilton 2005). Client size is argued to proxy for agency costs, and it surrogates the client requirement of higher audit quality and equivalent audit firm capacity to provide efficient audit services (Simunic and Stein 1987; Francis and Wilson 1988). The logarithm of audit clients' total assets is used here to proxy the auditee size. LnSub and Foreign measure clients' subsidiary numbers and foreign subsidiary portion, respectively. We predict that the more complex clients with a greater number of subsidiaries and more geographic dispersion are more likely to employ brand name auditors and benefit from their multi national locations and nexus of international services. Thus positive associations are expected between the choice of a Big 4 auditor and these variables.

The greater the client's risk, the higher the propensity for the impairment of agency relationships. To mitigate the associated agency costs, higher quality auditors, surrogated by Big 4, are more likely to be selected to signal the credibility of reporting (Simunic and Stein 1987; Francis and Wilson 1988 and DeFond 1992). Experienced large audit firms are also more likely to undertake a complete risk assessment process and assign specialist personnel to audit the riskier clients more efficiently (Johnston and Bedard 2003). Therefore, we expect firms' leverage (DE), current assets proportion (CATA), and quick ratio (Quick) are determinants of the audit firm selection decision. A positive sign is predicted for DE, a negative sign is expected for Quick and a positive sign is expected for CATA. We predict that firms reporting higher profitability (ROI) are more likely to engage with large auditors to signal the credibility of their reporting. For firms with a history of losses, they could require a brand name auditor as a signaling mechanism. However, firms reporting losses in previous periods could be viewed as greater risks for the Big 4. We therefore have no predictive sign

for the Loss variable.

We also include the proportion of intangible assets to total assets in our auditor choice model. We expect that there are higher incentives for firm managers to engage with higher quality auditors such as Big 4 accounting firms due to the difficulties in observing and obtaining reliable market value measures for such assets. If the choice of Big 4 provides assurance to reduce the potential agency costs associated with intangible assets, the auditees will be more likely to appoint brand name auditors as their monitoring mechanisms. On the other hand, Big 4 accounting firms could apply more scrutiny in auditing intangible assets due to the higher risk involved. Correspondingly, potential disagreements between clients and incumbent auditors upon reporting become more probable. This could be the incentive for clients with a large proportion of intangible assets to choose non-Big 4 auditors. Thus, an inverse relationship between intangible portion and Big 4 selection might be observed. We therefore have no predictive sign for intangible assets.

The standard control variables and their predicted signs in the audit fee model are discussed in Ferguson et al (2003). We add the ratio of intangible assets to total assets on the basis that higher intangible components recognised in financial reporting could expose the incumbent auditor to a higher risk sharing with the auditees due to the possible difficulties in obtaining reliable evidence of the intangibles assets' market value. It could also require an extended workload upon investigation and assurance as well as specialised knowledge. Thus, to compensate for the extra work and risk, audit fees are expected to be higher.

3.2 Data

The sample comprises 1253 observations, which represents all available Australian publicly listed companies for 2003. Data are obtained from the Capital Markets Co-operative Research Centre-UTS Australian audit market database.. Consistent with prior studies discussed above, logarithm transformations are made to certain variables (LnAF, LnTa, and LnSub). If a company has zero subsidiaries, it is re-coded as 1 before taking the natural log. In addition, extreme values in the variables, LnAF, LnTA, Quick, DE, and ROI, are winsorized to a maximum value of mean +/- three standard deviations to ensure the models are well specified and have statistical conclusion validity.[10]

4. Results

[10] The winsorizing does not affect our conclusions. The results are available from the authors.

4.1 Descriptive Statistics

Table 2 reports descriptive statistics (mean, median and standard deviation) for regression variables for the full sample of 1253 observations and separately for the Big 4 audited clients (n = 747) and the non-Big 4 audited clients (n = 506) in 2003.

(Insert Table 2 here)

Table 2 also reports the results of tests for differences in the variables for Big 4 and non-Big 4 auditors. The results indicate that except for DE, Quick, CATA and ROI, the variables are significantly different across the auditor groups. As expected, on average, large auditors engage with larger, more complex clients as reflected by LnTA, LnSUB, and Foreign, and receive higher audit fees. In contrast, non-Big 4 clients receive more qualified opinions and associate with more clients reporting losses and greater intangible assets.

Table 3 presents Pearson (above diagonal) and Spearman (below diagonal) correlations among the variables used in our model estimation.

(Insert Table 3 here)

Client size is significantly correlated with all variables, except intangible assets, which implies that auditee size is an important factor in our examination. Similarly, the number of subsidiaries, which proxies for client complexity has significant correlations with most of the control variables (exceptions are ROI and DE). Use of a Big 4 auditor is significantly correlated with all variables except Quick, CATA, and intangible assets (Spearman correlations).

4.2 Model Estimation

4.2.1 Big 4 Auditor Choice Regression Results

The Big 4 auditor choice model results are presented in Table 4.

(Insert Table 4 here)

In Panel A, we report probit results for the Big 4 choice model. The choice equation has a

pseudo R square of 0.1594 with a significant χ^2, which indicates the significance of the model estimation. Only client size (LnTA), leverage (DE), liquidity (CATA), Loss and intangible assets are statistically significant in the regression. In short, the choice model indicates that firms characterized as relatively larger and more highly levered, with a large portion of assets represented by current assets and experiencing losses are more likely to choose Big 4 auditors. Firms reporting more intangible assets would choose non-Big 4 auditors.

To assess the accuracy of the choice model classifications, we estimate the probability of auditor selection according to the probit equation. Predicted auditor choices are based on a cut off level of 0.50. Firms with a probability of Big 4 auditor choice greater (less) than 0.50, are predicted to choose Big 4 (non-Big 4) auditors. The estimation results are reported in Panel B. It shows that, on average, about 69 percent of actual auditor choices are consistent with our model estimation, with accuracy levels of 77.24 percent and 55.93 percent within the Big 4 and non-Big 4 auditor groups, respectively. The overall accuracy rate compares favorably with a naïve prediction equivalent to the underlying proportion of firms using Big 4 auditors of 59.62 percent.

4.2.2 Audit Fee Regression Results

Table 5 Panel A presents the estimations for the audit fee regression using the conventional OLS estimation method. In column 1, we first replicate the approach in previous audit fee studies by including the auditor size dummy in the equation as an exogenous predictor of audit fees. Then, we re-estimate the audit fees regressions for Big 4 and non-Big 4 auditee groups in columns 2 and 3 separately without controlling for any self-selection bias.

(Insert Table 5 here)

For the OLS regression reported in column 1, the adjusted R square is 78.53 percent with a significant F test result ($p < 0.001$) indicating that the regression model explains nearly 80 percent of the cross-sectional variation in audit fees, which is consistent with prior audit fee studies. The coefficient on the auditor size dummy is positive and statistically significant. The coefficient of 0.381 suggests that, on average, Big 4 auditors charge around 46 percent higher than non-Big 4 auditors.[11] This is higher than the auditor size effect documented in the previous Australian studies such as Francis (1984) and Craswell et al. (1995).[12] The signs of

[11] The procedure described in Simon and Francis (1988, p. 263, footnote 7) and Craswell et al. (1995, p. 307) is used to calculate the magnitude of the percentage shift in audit fee regression model to infer the magnitude of changes in audit prices attributable to brand name reputation.

[12] Francis (1984) reports a coefficient of 0.153 for the auditor dummy; Craswell et al (1995) report a

coefficients on the other control variables are generally consistent with standard expectations except for YE, which is statistically insignificant. Leverage (DE), ROI, and Loss are not significant in the fee regression.

There is a positive and significant sign on intangible assets in column 1. This is consistent with a prediction that the greater workload involved in auditing these assets and the additional risk exposure are associated with greater auditor compensation.

Splitting the sample and running separate regressions in columns 2 and 3, allow the slope coefficients as well as intercepts to vary across different audit groups. Whilst all the control variables are significant in the audit fee regression for Big 4 clients, DE, ROI, YE and Intangible are not significant for non-Big 4 clients. Correspondingly, the adjusted R square for the non-Big 4 audit fee model is reduced to 54 percent whereas the Big 4 adjusted R square remains at 80 percent (both models are significant at $p < 0.001$). It implies that different factors could be involved in determining the audit fees charged by different auditor groups in Australia.[13]

A test of the difference between the slope coefficients in the two regressions, as reported in Panel B, allows us to reject the null hypothesis that all slope coefficients (excluding intercepts) are equal across the auditor groups. Further tests for differences between each pair of coefficients show that Big 4 auditors would charge higher fees than non-Big 4 auditors to firms which are larger (LnTA), have higher profitability (ROI), experience losses (Loss), and have greater proportions of total assets held as intangible assets. In addition, the lower intercept in the Big 4 regression suggests that Big 4 auditors would charge a smaller fixed fee component to their clients. Our findings are consistent with Chaney et al.'s (2004) proposition that both intercepts and slope coefficients of audit fee regressions are likely to vary across auditor groups. It suggests that different auditor groups would apply different audit fee structures to their clients.

4.2.3 Heckman Selection Model Results

Table 6 presents the results of audit fee regressions for clients of non-Big 4 and Big 4 auditors using the Heckman self-selection model. Potential self selection bias arises and needs to be

coefficient of 0.269. Francis and Stokes (1986) report a significant result on Big 8 dummy (0.172) in the small client segment, while Carson et al. (2004) show evidence of significant Big 6/5 coefficients ranging from 0.137 to 0.319 from 1995 to 1999. Ferguson and Stokes (2002) document a significant Big 6 indicator (0.34) within industries without specialist auditors in 1992.

[13] Our results are different to the findings in Ireland and Lennox (2002) that there is no significant difference between the coefficients for Big 5 and non-Big 5 audit fee regressions. Also, their adjusted R squares for the two regressions are similar to each other.

controlled in the audit fee model where the correlation between the error terms from the estimation for the auditor choice model (u in equation 4) and audit fee model (ε in equation 5) is statistically significant (in our study, Rho = 0.463, $p < 0.006$) . The Heckman self-selection specification includes the IMR (λ_{0i} and λ_{1i}), calculated from the auditor choice model, into the audit fee model, which controls for potential self-selection bias.[14] A significant coefficient for the IMR demonstrates the need to control for self-selection bias.

(Insert Table 6 here)

In the self-selection model, the χ^2 for both equations are statistically significant. For the non-Big 4 equation, only LnSub and Quick are significant. The coefficients on client size (LnTA), CATA, Foreign, Loss and Opinion all lose their statistical significance in fee determination. In contrast, for the Big 4 equation, most of the variables remain significant, except for Loss and YE. The magnitudes of coefficients for other variables have changed. In particular, the constant in the Big 4 fee equation becomes insignificant.

The coefficient of $\lambda_{1i,}$ but not $\lambda_{0i,}$ is significant, suggesting that reliance on OLS fee regressions to infer audit fee premiums could yield biased results.[15] We investigate whether there is a bias in section 4.2.4. We also contrast the slope coefficients estimated for the Big 4 and non-Big 4 audit fee regressions after allowing for self-selection. The null hypothesis that all slope coefficients are equal across different auditor-groups is rejected, as presented in Panel B. There appears to be a significantly higher constant in the non-Big 4 equation than the Big 4, which implies a lower fixed audit fee component charged by Big 4 auditors.

4.2.4 Fee Expectation Results

Given the self-selection bias revealed in section 4.2.3 and the differences in the slope

[14] There are two approaches to applying the Heckman selection model: two-step and two-part. The two-step procedure (which we adopt in the main test) produces the regression estimation encompassing the selection equation in a single process (and is a standard function in the STATA statistical package). The two-part model is a separate probit for sample inclusion followed by an OLS regression including the IMR calculated from the probit equation. The two approaches make different assumptions about rho, the correlation between the errors from each equation. Where necessary, the two-step method truncates the value of rho to +1 or -1, but no adjustment is made with the two-part (or plug in) approach. The results show that the coefficients on all variables in the audit fee regression from both approaches are identical, but the significance of the IMR (and other variables) can vary. The VIF from the OLS audit fee regression in the two-part approach suggests high multicollinearity between the variables (typically IMR and LnTA) and with that approach inferences of a self-selection bias are unreliable. We provide some sensitivity tests and attempt to address this multicollinearity in section 4.4.

[15] When running the Heckman selection procedure, the correlation coefficient, rho, between the residuals from probit equation and the residuals from the fee regression exceeds the boundary of acceptable values [-1,1]. STATA truncates rho in the selection model to 1 to allow the fee model estimation.

coefficients, we follow an approach used in Chaney et al. (2004) to evaluate the existence of a Big 4 audit fee premium in our sample by computing the difference between the actual audit fee and the expected audit fee had the alternative choice of auditor-type been taken. The first test (Table 7, Panel A) compares the actual fee paid by all Big 4 clients with the expected fee those auditees would have paid if they had chosen a non-Big 4 auditor. The predicted alternative audit fees are computed by multiplying model parameters, estimated for the Non-Big 4 auditor sample, with measures of explanatory variables for the Big 4 auditees. The Big 4 auditees group is then broken into two sub-groups – those who were correctly predicted by the auditor choice model to have a big 4 auditor and those with an unpredicted choice.

(Insert Table 7 here)

The test shows that on average audit fees would have been significantly lower if a non-Big 4 auditor had been chosen (based on the positive mean difference between actual and expected alternate fees). Chaney et al (2004) argue that if the auditor choice is predicted from observable characteristics, the surprise element is likely to be small and relatively unimportant in auditor pricing (p. 69). So it is more likely that we would see a Big 4 premium in the unpredicted choice group than the predicted choice group if there is a self-selection issue in the premium.

The results show that both groups of clients would receive lower fees from non-Big 4 auditors than the existing fees charged by their incumbent Big 4 auditors. Chaney et al (2004) report no Big 4 premium in the predicted choice group and a significant premium in the unpredicted choice group. However, in contrast to the results reported by Chaney et al (2004), we find the surprise element in the audit fee does not lead to a greater Big 4 premium in the unpredicted choice group relative to the predicted choice group.[16] Therefore, in contrast to Chaney et al, the test does not support the conclusion that the Big 4 premium is due entirely to sample selection bias.

Panel B of Table 7 reports the results of estimating the auditor choice effect for clients of non-Big 4 auditors. The result for testing the difference between the actual audit fee and the expected alternate fee for using a Big 4 auditor shows that higher fees would be paid if these companies select a Big 4 as their incumbent auditors. This conclusion is strengthened by separating non-Big 4 clients into different groups according to auditor choice model predictions. Compared with non-Big 4 clients making predicted choices, firms making

[16] In fact, the mean difference between the predicted auditor choice group and the unpredicted auditor choice group is significant at $p=0.0176$.

unpredicted non-Big 4 auditor choices would pay higher fees if the Big 4 accounting firms were selected.[17] There is evidence of a Big 4 premium that means there are cost savings for choosing non-Big 4 auditors.

Overall our findings lend more support for the conventional notion that Big 4 auditors charge higher fees over non-Big auditors for listed companies. Our conclusion differs from Chaney et al.'s (2004) conclusion that the clients do not regard the Big 4 as quality superior auditors and self-select the audit firms charging lower audit fees. We find that firms choosing to use non-Big 4 auditors are able to generate cost savings, and firms choosing to use Big 4 auditors are paying a premium. It suggests that public companies are prepared to pay a premium for choosing a Big 4 auditor. The next section interprets the implications of this finding for competition in the audit services market following the demise of Arthur Andersen.

4.3 Competition Testing Results

To investigate the audit market competition after the collapse of Arthur Andersen, we divide the Australian market into large and small client groups based upon the median of auditees' total assets (n=627 for the large client segment and n=626 for the small client segment). Approximately 43 percent of the companies in the small client group are Big 4 clients, whereas this proportion reaches approximately 77 percent in the large client segment. We replicate the above tests in section 4.2 in these two sub-samples to investigate audit pricing after taking the potential self-selection bias into account.

4.3.1 Descriptive Statistics

The descriptive data for both client segments are reported in Table 8. Here, we separately report the mean, median, and standard deviation for each variable in our estimation model for both client segments.

(Insert Table 8 here)

Table 8 (last column) shows that apart from the size difference, small firms have higher quick ratios, more current assets, are more likely to have a qualified opinion (Opinion) and report more losses and intangible assets. In the small client segment, most of the clients' characteristics do not vary by auditor type. On average, Big 4 auditees in the small client segment are relatively larger (LnTA), have more current assets (CATA), receive fewer qualified opinions and report less intangible assets. However, in the large client segment the

[17] The mean difference between the predicted auditor choice group and the unpredicted auditor choice group is significant at p=0.0277.

results of testing for differences between auditor types are similar to those reported for the total sample in Table 2.

(Insert Table 9 here)

Panels A and B of Table 9 present the correlation matrices for the small and large client segments, respectively. As with the total sample population, client size correlates with most of the other variables across both client markets.

4.3.2 Auditor Choice Model Results

Table 10 presents the auditor demand equation results for the sample of small and large clients, respectively.

(Insert Table 10 here)

Panel A shows that splitting the sample into the two size segments reduces the power of the auditor choice model, although in both segments the χ^2 is statistically significant. In the small client segment most of the independent variables that are significant in the total sample (Table 4) remain significant. However, the low pseudo R square implies that there could be other dominant factors determining the auditor selection decisions in the small client segment. In the large client segment the significant variables are client size, proportion of foreign subsidiaries (Foreign), and ROI.

In the small client market, over 60 percent of firms' choices agree with the auditor choice model prediction (using the 50 percent cut-off probability level). The model is more accurate when predicting non-Big 4 auditor choice (78.27%) than Big 4 auditor choice (39.70%). In the large client segment, the model is more accurate when predicting Big 4 auditor choice. Less than 10 percent of large firms using non-Big 4 auditors are correctly classified, whereas 96 percent of firms using Big 4 auditors are correctly classified. This implies that our choice equation is considerably driven by client size.[18] Overall, our results suggest that different criteria could be involved in the auditor selection decision across different auditee size groups.

4.3.3 Audit Fee Regression Results

Table 11 presents the results for the OLS regression with an auditor size dummy variable for

[18] The exclusion of 'LnTA' from the auditor choice model significantly reduces the explanatory power of the model (R square reduces to 0.012 in the small client segment and 0.054 in the large client segment).

the small and large client segments, and for separate regressions for Big 4 and non-Big 4 in each client size segment.

(Insert Table 11 here)

All regressions are statistically significant and the explanatory power is greater in the large client segment than the small client segment (adjusted R square = 0.7712 and 0.4170 respectively). This is consistent with the results in Francis and Stokes (1986) and Carson et al. (2004), which indicate that the traditional audit fee model is not as well specified for the small client segment. The auditor size dummy is statistically significant in both regressions (model columns 1 and 4), although its coefficient is larger in the small client segment (0.429 for the small sample vis-à-vis 0.281 for the large sample).

OLS regressions are also separately estimated for the Big 4 and non-Big 4 auditor groups in each segment. The results (see model columns 2, 3 and 5, 6 in Table 11) indicate that the audit fee regressions have lower explanatory power for non-Big 4 auditees than Big 4 auditees.

Panel B of Table 11 reports the results of testing the equality of slope coefficients for the Big 4 and non-Big 4 audit fee regressions in each client segment. The null hypothesis that all slope coefficients are equal across the auditor-groups cannot be rejected in the large client segment whereas the same hypothesis is rejected in the small tier. It indicates that while in the large client segment, similar pricing structures are applied to clients of the Big 4 and non-Big 4 auditor groups, this is not the case in the small client segment.

4.3.4 Heckman Selection Model Results

Table 12 reports the results for the small and large client segments adopting the Heckman selection model which adjusts for self-selection bias.[19]

(Insert Table 12 here)

The results in Panel A show that none of the IMR coefficients are statistically significant for any audit fee regression in either tier. This indicates that there is no self-selection bias. In contrast to the regression results in Table 11, many of the control variables in the models lose significance for the small client segment and for the non-Big 4 large clients. However, the

[19] The correlation between the residuals for the choice and fee models in the large client segment is 0.188 ($p < 0.565$) and in the small client segment it is -0.819 ($p < 0.005$)

models all have significant explanatory power ($p < 0.001$).

The results of Wald tests for differences in slope coefficients between Big 4 and non-Big 4 audit fee regressions are presented in Panel B of Table 12. No difference in slope coefficients is found in the large client segment whereas there is some evidence of differences in the small client segment. This supports the inference based on the OLS regressions results in Table 11 that non-Big 4 and Big 4 auditors adopt similar pricing behaviors in the large client segment, but not in the small.

4.3.5 Pricing Behavior

Simunic's (1980) pricing framework for investigating audit market competition requires pricing behavior in the large and small client segments to be examined separately. The results in Tables 11 and 12 show that audit pricing behavior by non-Big 4 and Big 4 auditors in the large client segment is the same. Although there are relatively fewer non-Big 4 auditors than Big 4 auditors in the large client size segment, no adjustment for self-selection bias is required. The lack of differences in the slope coefficients and the absence of a self-selection bias indicate that the combined audit fee model with the inclusion of a Big 4 dummy variable is the appropriate fee model to apply to the large client market segment. Therefore, we can rely upon the results generated from the conventional OLS regression that there is a 32 percent Big 4 audit fee premium (based on the coefficient for audit size dummy of 0.281 reported in Table 11).

By contrast, although there is no evidence of a self-selection bias observed in the small client segment, there are differences in the slope coefficients of audit fee regressions across Big 4 and non-Big 4 auditor groups. This suggests that a Big 4 auditor dummy is not sufficient to measure the effect of the auditor on audit fees. In order to investigate auditor pricing behavior further in the small client sample, and analogous to the analysis in Table 7, the actual audit fees are compared with the expected alternate audit fees and results are reported in Table 13. The predicted alternative audit fees are computed by multiplying model parameters, estimated for the alternate auditor sample, with measures of explanatory variables for the auditees. The auditees are then broken into two sub-groups – those who were correctly predicted by the auditor choice model to have their chosen auditor type (Big 4 or non-Big 4) and those with an unpredicted choice.

(Insert Table 13 here)

Table 13 Panel A shows that small clients using Big 4 auditors would pay lower fees if they

choose non-Big 4 auditors (mean difference 0.426, t = 11.96). The Big 4 premium is not entirely due to the surprise element in auditor choice because both firms making predicted and unpredicted choices would pay less for non-Big 4 auditors. In Panel B the small clients using non-Big 4 auditors would pay more if they chose Big 4 auditors and this is not due to the surprise element in auditor choice.[20]

The higher fees charged by Big 4 auditors in both client segments support the existence of product differentiation with respect to Big 4 accounting firms. Our results are consistent with scenario (1) in Exhibit 1, wherein there is product differentiation in the services of Big 4 accounting firms. When clients voluntarily contract with a higher-priced auditor, it implies that a differentiated product is associated with that auditor under the Simunic 1980 framework. It suggests that perfect competition still prevails throughout the auditor market after the demise of Arthur Andersen.

Our results also show that the Big 4 premium is not always captured by the use of a dummy auditor variable in the regression. For the full sample, there are differences in both constant and slope coefficients between non-Big 4 and Big 4 auditors. After further controlling for client size by splitting the sample at median total assets, the Big 4 dummy captures the effect of different auditor pricing behavior for large clients, but slope coefficients for small clients still vary by auditor type. Splitting the sample by client size strengthens the claims of Big 4 audit fee premiums.

4.4 Sensitivity Tests[21]

The Heckman two-step method used in the tests above truncates the estimate of rho, the correlation between the errors in the auditor choice and audit fee regressions. In order to assess the effect of using the two-step method we re-estimate the Heckman selection model with a two-part method. In the two-part method the IMR is calculated from the probit model and 'plugged' into the OLS regression. Although the results indicate that there is self-selection bias in both Big 4 and non-Big 4 audit fee regressions in the combined 2003 sample, there are significant multicollinearity problems. The two-part method for the small and large client segments does not show evidence of a self-selection bias. The VIF for the IMR and LnTA are over 10, suggesting the results are unreliable. In an attempt to eliminate the potential multicollinearity problems involved, we estimate the selection model by excluding LnTA from both the auditor choice model and audit fee model. A notable decrease in the

[20] The mean differences between predicted and unpredicted auditor choice groups are statistically insignificant (p=0.2779 for Big 4 auditors, and p=0.5030 for non-Big 4 auditors).
[21] The detailed results are available from the authors.

explanatory power of the selection models is observed. No self-selection bias is found in any regressions, although multicollinearity problems persist with IMR significantly correlated with other variables.

We also run tests for the pooled sample and for the large and small client markets consistent with the approach by Khurana and Raman (2004) that involves including the IMR from the relevant choice model along with the auditor indicator variable in the second stage fee model estimation across all Big 4 and non-Big 4 clients. The results show that the Big 4 earn a premium in the pooled sample and in each of the large and small client markets after controlling for the IMR variable which is significant in the pooled and small client market segment.[22] These results are consistent with a competitive market outcome under Simunic's (1980) framework.

We also re-estimate the auditor choice model by only including variables statistically significant (at 10 percent level) in the combined sample. The explanatory power of the probit equation is similar to the original auditor choice equation used in reported results. It indicates that omitted variables have little effect in explaining auditor selection. The results on all the fee models are consistent with those produced using the full auditor choice model. The same model is also applied to both large and small client segments. There is no evidence that dropping insignificant variables from the probit model would affect our findings.

We also look at the sensitivity of the results to transformations on variables used in the regressions. We find that when the square root transformation is performed on the SUB variable in place of the logarithm transformation, the IMR for Big 4 auditees in the full sample becomes insignificant. This suggests the evidence of a self-selection bias for Big 4 auditees could be an artifact of the transformation.

Financial institutions account for 211 observations in our sample. Prior studies have questioned the inclusion of such observations in fee estimations because of the different regulatory regimes governing their operations. We re-run our analysis separately on: just these 211 observations (with the exception of the segment analysis, given the sample size); excluding these observations from the full sample and including a dummy financial institutions industry variable. Our primary results remain unaffected by these sensitivity tests.

Finally, we examine the potential for nonlinearities in client size to affect our findings. We first re-run our analysis and find, consistent with Francis and Stokes (1986) and Carson et al.

[22] However, we detected multicollinearity problems in the pooled and small client market fee regressions that included the IMR variable.

(2004) that, by reducing our sample to the 300 largest and smallest auditees from the market segments, the results in the small client segment remain unchanged and the fee premium in the large auditee segment disappears (scenario 4 in Exhibit 1). We also re-run our analysis using a client size dummy interaction with the auditor indicator variable consistent with Carson et.al. (2004). Contrary to their findings, we do not get a significant interaction result. We also re-run our analysis using the client size interaction model developed by Chaney et. al. (2005) for the variables we had in common and we do not find evidence of selection bias.[23]

5. Conclusion

A significant body of empirical-based research into audit pricing has laid claim to the existence of additional audit value being delivered by brand name (Big n) auditors over non-brand name auditors and that the audit market is competitive. The recent demise of Arthur Andersen has called into question whether our audit markets remain competitive. In Australia, the majority of Andersen's clients moved to Ernst & Young along with the audit partners, which was viewed as a merger of the two audit firms. The Australian Competition and Consumer Commission concluded that the merger raised concerns for competition in the audit market but the Commission's view was that their concentration thresholds would not be crossed in this market. Accordingly, they did not oppose the merger. Because increased supplier concentration by itself is insufficient evidence of collusive pricing arrangements (Simunic 1980) and concentration measures and thresholds are somewhat arbitrary, we adopt Simunic's (1980) audit-pricing framework with the segmentation assumption (small and large client segments categorizing by auditee size) to investigate whether subsequent to the merger any evidence of monopoly pricing emerged in the Australian audit market.

Recent studies using audit pricing models have questioned whether companies self-select their auditors which could induce a self-selection bias in the audit fee regression estimations and impact audit fee premiums estimates used as the basis for drawing inferences about market competition. Audit fee estimation models used to infer the existence of brand name premiums and test the competitiveness of audit markets assume that auditors are randomly allocated to client companies. This allows the Big n variable to be exogenous in the audit fee regression estimation. This study investigates whether audit markets remain competitive in the wake of Andersen's demise while also addressing potential self-selection bias in reported model estimations of audit fee premiums for Big n public company auditors. We do so using

[23] However, our models, with the size non-linearity controls suggested by Chaney et. al,.(2005), did not appear to be well specified, which limits the ability to rely on any inferences drawn from the models. More generally, the difficulty in detecting statistically reliable interaction effects explaining variation in a dependent variable has been raised elsewhere (see McClelland and Judd, 1993).

the approach outlined in previous audit fee studies (Ireland and Lennox 2002; Chaney et al. 2004) of applying the Heckman selection model in our analysis. Additionally, we also estimate the audit fee regressions for Big 4 and non-Big 4 auditors, respectively, allowing variation in both slope and intercept coefficients.

We find that Big 4 concentration is low in the small client market and high in the large client market. This supports the underlying assumption of Simunic's (1980) framework that the small client segment involves a large number of suppliers and can be regarded as a competitive benchmark, whereas the large client segment with Big 4 domination could be less competitive. For the whole sample population, we find some evidence of self-selection bias but it does not explain the conventional finding of audit fee premiums charged by large auditors. We show evidence of a Big 4 premium by predicting the alternative audit fees that would have been paid if clients engaged with the opposite auditor-type, and the results consistently suggest that Big 4 audit firms charge higher fees over non-Big 4 auditors. Significant variation in slope coefficients for audit fee regressions across different auditor groups is observed which supports the Chaney et al.'s (2004) proposition that different audit fee structures are applied across different auditor groups beyond that captured by a Big 4 dummy.

Separate analyses of small and large client segments show no evidence of self-selection biases in the audit fee regressions. In the large client market, we cannot reject the null hypothesis of the equality of slope coefficients across different auditor groups, but there is evidence of differing coefficients for small clients. This suggests that a Big 4 dummy is sufficient to capture variation in auditor pricing behavior for large clients, but not for small clients.

A consideration of auditor pricing behavior in both client size segments leads us to conclude that competition still prevails throughout the audit market post Andersen's demise with Big 4 product differentiation across the whole market. There is no evidence that self-selection bias affects the inference that Big 4 auditors attract audit fee premiums attributed to them being brand name suppliers of audit quality and that firms choosing to use non-Big 4 auditors are able to generate cost savings.

Our conclusion is consistent with Ireland and Lennox (2002) for the UK public company market. It differs from Chaney et al.'s (2004) conclusion on the UK private company market that the clients do not regard the Big 4 as brand name auditors and self-select the audit firms charging lower audit fees. The findings are also contrary to Chaney et. al.'s (2005) results on a sample of 2001 US public companies even after we attempt to control for the nonlinearities

in client size hypothesized by Chaney et. al. (2005). This suggests there are important differences in the audit pricing mechanisms operating between private and public company audit markets and/or across countries.

Finally, we note our conclusions are premised on the auditor selection model specification. While our model has significant explanatory power and we conduct some sensitive tests on the choice of model variables, there is scope for improving the model particularly for the small client segment. To what extent the findings are sensitive to improvements in the choice model specification, is an empirical question.

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Table 1 Descriptive Statistics for the Australian Audit Services Market

Panel A: Audit Services Market 1998-2003

	2003	2002	2001	2000	1999	1998
Number of companies	1,253	1,239	1,257	1,229	1,109	1,075
Total Assets – Sum of all companies	$1,880 billion	$2,014 billion	$1,969 billion	$1,790 billion	$1,478 billion	$1,410 billion
Total Assets – Average per company	$1,501 million	$1,624 million	$1,567 million	$1,460 million	$1,332 million	$1,311 million
Audit Fees – Sum of all companies	$283 million	$268 million	$256 million	$241 million	$210 million	$206 million
Audit Fees – Average per company	$226,003	$216,770	$203,752	$196,470	$189,394	$191,228
Other Fees paid to Auditors – Sum of all companies	$279 million	$358 million	$351 million	$379 million	$260 million	$235 million
Other Fees paid to Auditors – Average per company	$223,373	$289,574	$279,165	$308,069	$234,890	$218,610
Big 4(5) market share – based on number of companies	59.62%	62.95%	63.43%	63.79%	66.01%	65.21%
Big 4(5) market share – based on audit fees	92.22%	92.71%	92.34%	91.11%	92.24%	90.10%
Number of audit firms	94	90	92	91	94	95
Number of companies per audit firm						
Arthur Andersen	-	-	82	86	78	77
Ernst & Young	260	254	186	168	155	148
Deloitte	105	117	123	127	118	99
KPMG	176	179	182	177	170	164

PricewaterhouseCoopers	205	229	224	225	210	209
BDO	75	66	62	58	49	48
Pannell Kerr Foster	74	56	61	63	51	51
Grant Thornton	40	34	38	37	32	32
Other	318	304	299	288	246	247

Panel B: Big 4 Concentration Ratios by auditee size 1998 - 2003

Auditee size as measured	**No. of auditees**						**Big 4 concentration by number of auditees**						**Big 4 concentration by audit fees**					
by assets (in millions)	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**	**2003**	**2002**	**2001**	**2000**	**1999**	**1998**
Less than $2.5	162	129	111	77	111	96	32.10%	40.31%	47.75%	50.65%	45.95%	50.00%	39.44%	50.46%	56.40%	53.86%	50.92%	62.61%
$2.5 - $5	126	134	121	101	95	88	41.27%	44.78%	45.45%	54.46%	50.53%	48.86%	50.25%	54.41%	56.75%	62.04%	53.73%	53.10%
$5 - $10	174	162	178	170	138	143	41.95%	47.53%	49.44%	47.65%	54.35%	50.35%	54.92%	55.54%	55.14%	54.32%	56.10%	58.20%
$10 - $20	171	179	182	188	137	132	54.39%	56.98%	54.95%	50.53%	53.28%	50.00%	61.33%	64.22%	60.75%	55.50%	56.55%	52.95%
$20 - $50	175	193	207	209	177	169	61.71%	60.62%	56.04%	55.50%	61.02%	63.91%	69.39%	68.08%	62.23%	55.77%	62.64%	62.55%
$50 - $100	106	103	112	139	121	120	66.04%	74.76%	74.11%	71.94%	72.73%	67.50%	76.21%	82.97%	77.24%	78.31%	79.70%	74.81%
$100 - $250	113	117	124	117	99	109	76.11%	75.21%	75.81%	74.36%	78.79%	80.73%	80.70%	83.61%	82.72%	79.71%	84.94%	82.75%
$250 - $1000	112	110	112	120	135	126	90.18%	88.18%	89.29%	89.17%	88.89%	88.89%	94.52%	94.50%	94.10%	93.73%	90.66%	90.18%
Greater than $1000	114	112	111	108	96	92	98.25%	98.21%	98.20%	96.30%	94.79%	90.22%	99.69%	99.73%	99.75%	98.89%	99.11%	97.37%
Total	1,253	1,239	1,258	1,229	1,109	1,075												

Exhibit 1 Audit Pricing Framework (Big 4 vs. Non-Big 4)*

Large-client market	Small-client market		
	Big 4 > Non-Big 4	**Big 4 = Non-Big 4**	**Big 4 < Non-Big 4**
Big 4 > Non-Big 4	(1) Competition, and Big 4 product differentiation	(2) Big 4 monopoly	(3) Big 4 monopoly, and Big 4 scale economies
Big 4 = Non-Big 4	(4) Competition, Big 4 product differentiation, and non Big 4 scale diseconomies	(5) Competition	(6) Big 4 monopoly, and Big 4 scale economies
Big 4 < Non-Big 4	(7) Competition, Big 4 product differentiation, and non Big 4 scale diseconomies	(8) Competition, and non Big 4 diseconomies of scale	(9) Competition, and Big 4 scale economies

* Adapted from Simunic (1980)

Explanation of the nine scenarios:

(1) Big 4 fee premiums in both markets indicate that the audit market is competitive. Consistent higher fees reflect the recognition of Big 4 product differentiation throughout the market.

(2) Equivalent fees charged by all the auditors in small client market is consistent with the competitive assumption, and higher fees charged by Big 4 in the large client market evidences Big 4 monopoly pricing.

(3) (6) A Big 4 fee discount in the small auditee segment indicates the scale economies Big 4 audit firms achieved as well as the competitive assumption in lower tier market. If the audit fee discount is replaced by a Big 4 fee premium, it indicates the existence of monopoly pricing in the large auditee segment.

(4) (7) A Big 4 fee premium in the small auditee segment indicates the recognition of Big 4 product differentiation. On the other hand, the equivalent or smaller fees charged by Big 4 in the large segment imply that the non-Big 4 auditors have diseconomies of scales.

(5) Equivalent fees charged by all the auditors throughout the market indicate that the competition prevails throughout the market.

(8) A Big 4 fee discount indicates the non-Big 4 auditors' scale diseconomies. Equivalent fees charged by both auditors in small client segment indicate competition throughout the market.

(9) Big 4 fee discounts throughout the market indicates that the competition prevails throughout the market as well as the scale economies favor Big 4 auditors

Table 2
Descriptive Statistics for the sample of companies listed on the Australian Share Market (ASX) in 2003

Variable		Total	Non Big 4	Big 4	t-statistic (Difference)[a]
	No. of Obs.	1,253	506	747	
LnAF	**Mean**	10.932	10.184	11.439	-17.252***
	Std.	1.406	0.969	1.430	
	Median	10.757	10.151	11.308	
LnTA	**Mean**	17.142	15.916	17.972	-15.898***
	Std.	2.462	1.790	2.509	
	Median	16.791	15.949	17.684	
LnSUB	**Mean**	1.603	1.200	1.876	-9.301***
	Std.	1.306	0.953	1.436	
	Median	1.609	1.099	1.792	
DE	**Mean**	0.284	0.232	0.319	-0.585
	Std.	2.595	1.873	2.987	
	Median	0.047	0.014	0.085	
Quick	**Mean**	8.117	9.231	7.362	1.237
	Std.	26.234	27.815	25.098	
	Median	1.246	1.329	1.218	
Foreign	**Mean**	0.164	0.141	0.180	-2.600***
	Std.	0.262	0.251	0.268	
	Median	0	0	0	
CATA	**Mean**	0.428	0.443	0.418	1.446
	Std.	0.296	0.306	0.289	
	Median	0.390	0.399	0.384	
ROI	**Mean**	-0.498	-0.966	-0.181	-0.912
	Std.	14.957	17.486	12.970	
	Median	-0.020	-0.089	0.019	
Loss	**Mean**	0.694	0.816	0.612	7.890***
	Std.	0.461	0.388	0.488	
	Median	1	1	1	
Opinion	**Mean**	0.191	0.296	0.119	8.031***
	Std.	0.393	0.457	0.324	
	Median	0	0	0	
YE	**Mean**	0.161	0.117	0.191	-3.549***
	Std.	0.368	0.321	0.394	
	Median	0	0	0	
Intangible	**Mean**	0.122	0.139	0.111	2.277**
	Std.	0.218	0.239	0.201	
	Median	0	0	0	

* (**, ***) Significant at the 0.10 (0.05, 0.01) level (2-tailed).

a. T test on the equality of means between each variable for clients audited by non-Big 4 and Big 4 auditors.

Variable definitions:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets,
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
Opinion	= 1 if client receives a qualified opinion, 0 otherwise,
YE	= 1 if client has a non-June 30^{th} year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets.

Table 3 Correlation Matrix

	LnAF	LnTA	LnSub	DE	Quick	Foreign	CATA	ROI	Loss	Opinion	YE	Intangible	Big
LnAF	1	0.787**	0.753**	-0.052	-0.194**	0.308**	-0.046	0.044	-0.439**	-0.193**	0.198**	0.050	0.438**
p-Value		0.00	0.00	0.07	0.00	0.00	0.11	0.12	0.00	0.00	0.00	0.08	0.00
LnTA	0.761**	1	0.629**	-0.122**	-0.068*	0.163**	-0.266**	0.080**	-0.550**	-0.335**	0.188**	0.013	0.410**
p-Value	0.00		0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00
LnSub	0.698**	0.569**	1	-0.042	-0.183**	0.301**	-0.104**	0.040	-0.365**	-0.119**	0.163**	0.093**	0.254**
p-Value	0.00	0.00		0.14	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00
DE	0.528**	0.536**	0.407**	1	-0.023	-0.033	0.025	-0.309**	0.020	0.112**	0.034	-0.031	0.017
p-Value	0.00	0.00	0.00		0.41	0.25	0.37	0.00	0.47	0.00	0.23	0.27	0.56
Quick	-0.333**	-0.231**	-0.258**	-0.390**	1	-0.076**	0.183**	0.007	0.079**	-0.096**	-0.043	-0.085**	-0.035
p-Value	0.00	0.00	0.00	0.00		0.01	0.00	0.80	0.01	0.00	0.12	0.00	0.22
Foreign	0.403**	0.239**	0.480**	0.122**	-0.089**	1	0.051	0.006	-0.021	0.023	0.149**	0.055*	0.073**
p-Value	0.00	0.00	0.00	0.00	0.00		0.07	0.82	0.45	0.42	0.00	0.05	0.01
CATA	-0.008	-0.230**	-0.064*	-0.229**	0.318**	0.067*	1	-0.087**	0.117**	-0.061*	-0.028	-0.210**	-0.041
p-Value	0.77	0.00	0.02	0.00	0.00	0.02		0.00	0.00	0.03	0.33	0.00	0.15
ROI	0.412**	0.593**	0.310**	0.302**	-0.084**	0.116**	-0.072*	1	-0.061*	-0.009	-0.025	0.010	0.026
p-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.01		0.03	0.75	0.37	0.74	0.36
Loss	-0.468**	-0.593**	-0.347**	-0.393**	0.172**	-0.077**	0.108**	-0.612**	1	0.282**	-0.128**	0.038	-0.218**
p-Value	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00		0.00	0.00	0.18	0.00
Opinion	-0.189**	-0.343**	-0.107**	-0.083**	-0.221**	-0.001**	-0.075**	-0.359**	-0.282**	1	-0.042	0.052	-0.221**
p-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.14	0.07	0.00
YE	0.201**	0.182**	0.161**	0.117**	-0.044	0.154**	-0.017	0.142**	-0.128**	-0.420	1	-0.043	0.100**
p-Value	0.00	0.00	0.00	0.00	0.12	0.00	0.54	0.00	0.00	0.14		0.13	0.00
Intangible	0.273**	0.170**	0.269**	0.166**	-0.152**	0.158**	-0.046	0.075**	-0.112**	-0.035	0.004	1	-0.064*
p-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.01	0.00	0.21	0.89		0.02
Big	0.455**	0.414**	0.232**	0.212**	-0.051	0.107**	-0.035	0.190**	-0.218**	-0.221**	0.100**	-0.043	1
p-Value	0.00	0.00	0.00	0.00	0.07	0.00	0.22	0.00	0.00	0.00	0.00	0.13	

Note: See Table 2 for variable definitions. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Pearson Correlations are presented above the diagonal, and Spearman's rho correlations are reported below the diagonal.

Table 4 Probit model for auditor choice

Panel A Auditor Choice Model

	Expected Sign	Coefficient	z-value
LnTA	+	0.313	11.21 ***
LnSub	+	0.003	0.07
DE	+	0.048	2.95 ***
Quick	-	-0.001	-0.88
Foreign	+	0.025	0.16
CATA	+	0.367	2.58 **
ROI	+	0.003	0.94
Loss	?	0.186	1.72 *
Intangible	?	-0.392	-2.18 **
Constant	?	-5.292	-10.35 ***
No. of Obs.		1,253	
Pseudo R^2		0.1594	
LR Chi^2		269.43 ***	

Panel B Consistency of Auditor Selection

		Predicted Choice		
		Big 4	**Non-Big 4**	**Total**
Actual Choice	**Big 4**	577	170	747
	Non-Big 4	223	283	506
	Total	800	453	1253

% Total Correctly Classified	68.64%
% Correctly Classified in Big 4 group	77.24%
% Correctly Classified in non-Big 4 group	55.93%
% Using Big 4	59.62%

* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

-

Panel A presents the probit regression results for the Big 4 choice model:

$$Big_i = \beta_1 + \beta_2 LnTA_i + + \beta_2 LnSub_i + \beta_3 DE_i + \beta_4 Quick_i + \beta_5 Foreign_i + \beta_6 CATA_i + \beta_7 ROI_i \beta_8 Loss_i + \beta_9 Intangible_i + e_i$$

where:

Big	= 1 if firm i chose a Big 4 auditor, 0 otherwise,
LnTA	= natural log of client total assets,
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets.

Panel B provides the distribution of auditor engagements that are consistent with the choice model prediction and those are not. Audit firm classification is based upon the prediction to choose a Big 4 (non-Big 4) auditor if the estimated probability from the probit model is greater (less) than 0.5.

Table 5 OLS Regression Audit Fee Model (Using Big Dummy Variable)

Panel A: Audit Fee Regressions

	Model columns Expected Sign		(1) Total	(2) Non-Big 4	(3) Big 4
LnTA	+	**Coef.**	0.319***	0.261***	0.346***
		t	25.93	12.03	23.48
LnSUB	+	**Coef.**	0.369***	0.325***	0.362***
		t	19.00	9.09	15.68
DE	+	**Coef.**	0.010	0.012	0.021**
		t	1.36	0.77	2.25
Quick	-	**Coef.**	-0.006***	-0.006***	-0.005***
		t	-7.51	-5.75	-4.99
Foreign	+	**Coef.**	0.437***	0.317***	0.524***
		t	5.82	2.64	5.56
CATA	+	**Coef.**	0.815***	0.735***	0.828***
		t	11.81	6.81	9.39
ROI	?	**Coef.**	0.000	-0.002	0.005**
		t	0.24	-1.32	2.20
Loss	?	**Coef.**	-0.019	-0.186**	0.061**
		t	-0.39	-2.15	1.05
Opinion	+	**Coef.**	0.221***	0.213***	0.185**
		t	4.24	3.05	2.37
YE	-	**Coef.**	0.058	-0.080	0.106*
		t	1.11	-0.87	1.73
Intangible	+	**Coef.**	0.261***	0.006	0.537***
		t	2.96	0.05	4.47
Big	+	**Coef.**	0.381***		
		t	9.14		
Constant	?	**Coef.**	4.203***	5.421***	4.000***
		t	19.15	14.03	14.60
No. of Obs.			1,253	506	747
R^2			0.7874	0.5545	0.8062
Adj. R^2			0.7853	0.5446	0.8033
F Test			382.65***	55.90***	277.95***

Panel B: Wald test for Differences in Slope Coefficients between Big 4 and Non-Big 4

Differences in Slope Coefficients:	**Chi^2**	394.61
	P >	0.0000

* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

Panel A presents the OLS audit fee regression in total sample population, and audit fee regression estimations for Big 4 and non-big 4 auditee groups, respectively.
The OLS regression estimated is:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + \beta_{13} Big + u_i$$

Big 4 and non-Big 4 audit fee regression estimated is:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + v_i$$

where:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets ($000),
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
Opinion	= 1 if client receives a qualified opinion, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets,
Big	= 1 if firm i is audited by Big 4, 0 otherwise.

Panel B reports Wald test (Chow test) to examine the hypothesis that all slope coefficients (with the exception of intercept) are systematically same across Big 4 and non-Big 4 auditors.

Table 6 Heckman's two-step regression with control for self-selection bias

Panel A Audit Fee Regressions for Big 4 and Non-Big 4 Auditors

	Expected Sign		Non-Big 4	Big 4
No. of Obs.			506	747
LnTA	+	**Coef.**	-0.069	0.475***
		z	-0.29	9.51
LnSUB	+	**Coef.**	0.308***	0.353***
		z	4.05	10.98
DE	+	**Coef.**	-0.037	0.042***
		z	-0.82	2.87
Quick	-	**Coef.**	-0.005*	-0.005***
		z	-1.70	-4.09
Foreign	+	**Coef.**	0.335	0.550***
		z	1.27	4.32
CATA	+	**Coef.**	0.308	0.970***
		z	0.80	7.51
ROI	?	**Coef.**	-0.003	0.006**
		z	-0.74	2.12
Loss	?	**Coef.**	-0.342	0.080
		z	-1.55	0.98
Opinion	+	**Coef.**	0.198	0.163**
		z	1.62	2.13
YE	-	**Coef.**	-0.087	0.102
		z	-0.58	1.42
Intangible	+	**Coef.**	0.468	0.385**
		z	1.08	2.32
Constant	?	**Coef.**	9.530***	1.115
		z	3.07	1.03
λ_1	?	**Coef.**		0.972***
		z		2.99
λ_0	?	**Coef.**	-1.767	
		z	-1.44	
Wald Chi^2			257.42***	759.86***

Panel B: Wald test for Differences in Slope Coefficients between Big 4 and Non-Big 4

Differences in Slope Coefficients:	**Chi^2**	25.62
	P <	0.0074

* (**, ***) is denotes for significant at 10% (5%, and 1%) level (2-tailed).

Panel A reports estimates from the following regression:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + \beta_{13} \lambda_i + u_i$$

where:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets ($000),
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
Opinion	= 1 if client receives a qualified opinion, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets,
λ	= inverse-Mills ratio calculated from Probit regression described in Table 4

Panel B reports Wald test for examining the hypothesis that all slope coefficients (with the exception of intercept) are systematically same across Big 4 and non-Big 4 auditors.

Table 7 Treatment Effects of Auditor Choice

Panel A Treatment Effects of Big 4 Auditors

	Mean Value Difference in Fees [a]	t-statistic
All Firms		
Actual Fee - E (Alt. Fee)	0.500	19.73***
Firms Making Predicted Choice		
Actual Fee - E (Alt. Fee)	0.533	18.01***
Firms Making Unpredicted Choice		
Actual Fee - E (Alt. Fee)	0.389	8.211***

Panel B Treatment Effects of Non-Big 4 Auditors

	Mean Value Difference in Fees	t-statistic
All Firms		
Actual Fee - E (Alt. Fee)	-0.339	-10.93***
Firms Making Predicted Choice		
Actual Fee - E (Alt. Fee)	-0.278	-6.20***
Firms Making Unpredicted Choice		
Actual Fee - E (Alt. Fee)	-0.415	-10.17***

a Differences are taken on the natural logs.
* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

The treatment effect is measured for clients as the difference between the fees that would have been paid if they selected an alternative auditor type and the actual fees paid by them.
E (Alt. Fee) is computed by multiplying model parameters, estimated for one sample group such as Big 4 (non-Big 4), with measures of explanatory variables for auditees in the other sample groups - non-Big 4 (Big 4). The audit fee model used to estimate the parameters is

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + v_i$$

where the variables are defined in Table 6.
Panel A reports treatment effects for Big 4 auditees, The treatment effect is reported for all the Big 4 clients first, then for firms consistent and inconsistent with auditor choice model classification respectively. The firm is predicted to choose a Big 4 (non-Big 4) auditor if the estimated probability from the probit model is greater (less) than 0.5.
Panel B reports the same treatment effect results but for non-Big 4 auditees.

Table 8 Descriptive Statistics for Small and Large Clients Segments in 2003
(Large clients have total assets greater than sample median (≥$19,601,990)

		Small Clients				Large Clients				
Variable		Total	Non Big 4	Big 4	t-statistic[a] (Difference)	Total	Non Big 4	Big 4	t-statistic (Difference)	t-statistic (Difference in Total)[b]
	No. of Obs	626	359	267		627	147	480		
LnAF	Mean	10.066	9.849	10.359	-8.275***	11.797	11.001	12.041	-8.661***	-27.631***
	Std.	0.802	0.783	0.733		1.347	0.893	1.369		
	Median	10.067	9.815	10.336		11.679	10.942	11.92		
LnTA	Mean	15.243	15.078	15.465	-3.796***	19.038	17.961	19.367	-8.681***	-42.796***
	Std.	1.274	1.319	1.177		1.817	0.938	1.893		
	Median	15.528	15.371	15.718		18.594	17.747	18.997		
LnSUB	Mean	0.967	0.956	0.982	-0.375	2.238	1.794	2.374	-4.514***	-19.717***
	Std.	0.83	0.813	0.852		1.383	1.007	1.453		
	Median	1.099	1.099	1.099		2.197	1.946	2.398		
DE	Mean	0.366	0.259	0.509	-0.842	0.202	0.164	0.214	2.366**	1.118
	Std.	3.664	2.221	4.986		0.223	0.169	0.237		
	Median	0	0	0		0.159	0.116	0.177		
Quick	Mean	10.655	10.907	10.317	0.256	5.582	5.138	5.718	-0.262	3.437***
	Std.	28.465	30.511	25.508		23.551	19.225	24.741		
	Median	1.924	1.74	2.321		1.058	1.055	1.059		
Foreign	Mean	0.129	0.131	0.126	0.266	0.199	0.164	0.21	-1.818*	-4.775***
	Std.	0.25	0.248	0.253		0.27	0.26	0.272		
	Median	0	0	0		0	0	0		

		Small Clients				Large Clients				
Variable		Total	Non Big 4	Big 4	t-statistic (Difference)	Total	Non Big 4	Big 4	t-statistic (Difference)	t-statistic (Difference in Total)
CATA	**Mean**	0.469	0.451	0.493	-1.649 *	0.387	0.421	0.376	1.775 *	4.978 ***
	Std.	0.315	0.316	0.313		0.271	0.281	0.267		
	Median	0.442	0.415	0.456		0.353	0.371	0.353		
ROI	**Mean**	-1.022	-1.38	-0.541	-0.491	0.025	0.045	0.019	1.061	-1.239
	Std.	21.155	20.754	21.713		0.263	0.164	0.286		
	Median	-0.236	-0.224	-0.256		0.062	0.05	0.064		
Loss	**Mean**	0.944	0.939	0.951	-0.677	0.445	0.517	0.423	2.012 **	22.794 ***
	Std.	0.23	0.24	0.216		0.497	0.501	0.495		
	Median	1	1	1		0	1	0		
Opinion	**Mean**	0.31	0.368	0.232	3.658 ***	0.072	0.122	0.056	2.732 ***	11.248 ***
	Std.	0.463	0.483	0.423		0.258	0.329	0.23		
	Median	0	0	0		0	0	0		
YE	**Mean**	0.109	0.106	0.112	-0.259	0.214	0.143	0.235	-2.403 **	-5.106 ***
	Std.	0.311	0.308	0.316		0.41	0.351	0.425		
	Median	0	0	0		0	0	0		
Intangible	**Mean**	0.132	0.15	0.107	2.21 **	0.113	0.114	0.113	0.055	1.498
	Std.	0.239	0.253	0.218		0.193	0.2	0.191		
	Median	0	0	0		0.009	0.015	0.007		

* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

a. t statistic for the test for equality of means between each variable for clients audited by non-Big 4 auditors and Big 4 auditors.

b. t statistic for the test for equality of means between each variable for the small client segment and the large client segment (i.e., a comparison of the means in the column 'Total').

Variable definitions:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets,
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets.

Table 9 Correlation Matrix for the Sample of Small and Large Client Segments in 2003

Panel A Correlation Matrix for the Sample of Small Client Segments (Small clients have total assets less than sample median (< $19,601,990)

	LnAF	LnTA	LnSub	DE	Quick	Foreign	CATA	ROI	Loss	Opinion	YE	Intangible	Big
LnAF	1	0.357**	0.398**	-0.098*	-0.240**	0.243**	0.052	0.054	-0.071	0.066	0.042	0.076	0.314**
p-Value		0.00	0.00	0.01	0.00	0.00	0.19	0.18	0.08	0.10	0.29	0.06	0.00
LnTA	0.389**	1	0.222**	-0.290**	0.040	0.125**	-0.291**	0.143**	-0.141**	-0.201**	0.050	0.195**	0.150**
p-Value	0.00		0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00
LnSub	0.422**	0.223**	1	-0.074	-0.174**	0.266**	-0.108**	0.050	-0.044	0.086*	0.104**	0.088*	0.015
p-Value	0.00	0.00		0.07	0.00	0.00**	0.01	0.21	0.28	0.03	0.01	0.03	0.71
DE	0.352**	0.215**	0.215**	1	-0.029	-0.036	0.045	-0.309**	0.016	0.124**	0.058	-0.042	0.034
p-Value	0.00	0.00	0.00		0.47	0.36**	0.27	0.00	0.68	0.00	0.15	0.29	0.40
Quick	-0.308**	0.007	-0.205**	-0.368**	1	-0.049	0.299**	0.014	0.023	-0.178**	-0.008	-0.099*	-0.010
p-Value	0.00	0.86	0.00	0.00		0.22	0.00	0.73	0.56	0.00	0.85	0.01	0.80
Foreign	0.294**	0.138**	0.439**	0.086*	-0.118	1	0.005	0.002	0.055	0.084*	0.148**	0.044	-0.011
p-Value	0.00	0.00	0.00	0.03	0.14	**	0.90	0.96	0.17	0.04	0.00	0.27	0.79
CATA	0.050	-0.237**	-0.106**	-0.097*	0.245**	-0.011	1	-0.109**	-0.049	-0.161**	-0.023	-0.264**	0.066
p-Value	0.21	0.00	0.01	0.02	0.00	0.78**		0.01	0.22	0.00	0.57	0.00	0.10
ROI	-0.012	0.465**	0.008	0.030	-0.015	-0.029	-0.101*	1	-0.111**	0.004	-0.052	0.015	0.020
p-Value	0.76	0.00	0.85	0.46	0.72	0.48	0.01		0.01	0.92	0.19	0.71	0.62
Loss	-0.094*	-0.209**	-0.045	-0.121**	0.082*	0.050	-0.049	-0.342**	1	0.088*	0.018	0.043	0.027
p-Value	0.02	0.00	0.27	0.00	0.04	0.21	0.22	0.00		0.03	0.65	0.29	0.50
Opinion	0.067	-0.168**	0.085*	0.106**	-0.073	0.083*	-0.171**	-0.282**	0.088*	1	0.055	0.026	-0.145**
p-Value	0.09	0.00	0.03	0.01	0.07	0.04	0.00	0.00	0.03		0.17	0.52	0.00
YE	0.058	0.070	0.102*	0.063	-0.009	0.110**	-0.012	0.061	0.018	0.055	1	-0.020	0.010
p-Value	0.15	0.08	0.01	0.12	0.83	0.01	0.77	0.13	0.65	0.17		0.63	0.80
Intangible	0.171**	0.242**	0.142**	0.170**	-0.100*	0.062	-0.131**	0.046	-0.046	-0.006	-0.021	1	-0.088*
p-Value	0.00	0.00	0.00	0.00	0.01	0.12**	0.00	0.25	0.25	0.89	0.59		0.03
Big	0.322**	0.163**	0.008	0.023	-0.046	-0.022	0.069	-0.004	0.027	-0.145**	0.010	-0.136**	1
p-Value	0.00	0.00	0.84	0.56	0.25	0.58	0.08	0.92	0.50	0.00	0.80	0.00	

Note: See Table 2 for variable definitions. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Pearson Correlations are presented above the diagonal, and Spearman's rho correlations are reported below the diagonal.

Panel B Correlation Matrix for the Sample of Large Client Segments
Large clients have total assets greater than sample median (≥$19,601,990)

	LnAF	LnTA	LnSub	DE	Quick	Foreign	CATA	ROI	Loss	Opinion	YE	Intangible	Big
LnAF	1	0.734**	0.752**	0.173**	-0.140**	0.323**	0.056	0.061	-0.186**	-0.090*	0.187**	0.123**	0.327**
p-Value		0.00	0.00	0.00	0.00	0.00	0.16	0.13	0.00	0.03	0.00	0.00	0.00
LnTA	0.672**	1	0.555**	0.268**	-0.015	0.078	-0.233**	0.120**	-0.286**	-0.168**	0.162**	-0.030	0.328**
p-Value	0.00		0.00	0.00	0.71	0.05	0.00	0.00	0.00	0.00	0.00	0.45	0.00
LnSub	0.751**	0.530**	1	0.140**	-0.160**	0.285**	0.000	0.042	-0.165**	-0.009	0.110**	0.177**	0.178**
p-Value	0.00	0.00		0.00	0.00	0.00**	1.00	0.29	0.00	0.82	0.01	0.00	0.00
DE	0.292**	0.381**	0.267**	1	-0.108**	-0.091*	-0.315**	-0.096*	-0.052	0.013	0.072	-0.002	0.094*
p-Value	0.00	0.00	0.00		0.01	0.02**	0.00	0.02	0.19	0.75	0.07	0.97	0.02
Quick	-0.201**	-0.211**	-0.164**	-0.265**	1	-0.082*	-0.007	-0.007	0.042	-0.039	-0.052	-0.075	0.010
p-Value	0.00	0.00	0.00	0.00		0.04	0.86	0.85	0.29	0.33	0.19	0.06	0.79
Foreign	0.421**	0.081*	0.431**	-0.043	0.060	1	0.143**	0.022	0.068	0.048	0.123**	0.083*	0.073
p-Value	0.00	0.04	0.00	0.28	0.14		0.00	0.58	0.09	0.23	0.00	0.04	0.07
CATA	0.093*	-0.265**	0.038	-0.351**	0.245**	0.205**	1	-0.037	0.111**	-0.011	0.005	-0.151**	-0.071
p-Value	0.02	0.00	0.35	0.00	0.00	0.00*		0.35	0.01	0.78	0.91	0.00	0.08
ROI	0.150**	0.149**	0.125**	0.030	-0.015	0.049	0.080*	1	-0.349**	-0.295**	0.099*	-0.053	-0.042
p-Value	0.00	0.00	0.00	0.45	0.72	0.23	0.05		0.00	0.00	0.01	0.18	0.29
Loss	-0.217**	-0.364**	-0.175**	-0.209**	0.082*	0.055	0.101*	-0.526**	1	0.261**	-0.091*	0.008	-0.080*
p-Value	0.00	0.00	0.00	0.00	0.04	0.17	0.01	0.00		0.00	0.02	0.85	0.05
Opinion	-0.090*	-0.191**	-0.009	-0.018	-0.073	0.050	-0.021	-0.225**	0.261**	1	-0.070	0.077	-0.109**
p-Value	0.02	0.00	0.82	0.66	0.07	0.21	0.59	0.00	0.00		0.08	0.05	0.01
YE	0.215**	0.155**	0.115**	0.048	-0.009	0.136**	0.010	0.101*	-0.091*	-0.070	1	-0.057	0.096*
p-Value	0.00	0.00	0.00	0.23	0.83	0.00	0.81	0.01	0.02	0.08		0.16	0.02
Intangible	0.334**	0.051	0.316**	0.140**	-0.100*	0.206**	0.071	0.079*	-0.081*	0.006	-0.006	1	-0.002
p-Value	0.00	0.20	0.00	0.01	0.01	0.00	0.07	0.05	0.04	0.89	0.87		0.96
Big	0.354**	0.341**	0.191**	0.102	-0.046	0.098*	-0.070	0.021	-0.080*	-0.109**	0.096*	-0.022	1
p-Value	0.00	0.00	0.00	0.10	0.25	0.01	0.08	0.60	0.05	0.01	0.02	0.59	

Note: See Table 2 for variable definitions. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). Pearson Correlations are presented above the diagonal, and Spearman's rho correlations are reported below the diagonal.

Table 10 Probit model for auditor choice for small and large clients (Large clients have total assets greater than sample median (≥ $19,601,990))

Panel A Auditor Choice Model

	Expected Sign		Small Clients	Large Clients
LnTA	+	**Coef.**	0.283***	0.442***
		z	5.57	7.13
LnSub	+	**Coef.**	-0.021	-0.036
		z	-0.32	-0.59
DE	+	**Coef.**	0.041**	0.082
		z	2.48	0.26
Quick	-	**Coef.**	-0.004*	0.001
		z	-1.79	0.24
Foreign	+	**Coef.**	-0.208	0.477*
		z	-0.98	1.96
CATA	+	**Coef.**	0.586***	0.147
		z	3.11	0.60
ROI	+	**Coef.**	0.004	-0.686**
		z	1.05	-2.26
Loss	?	**Coef.**	0.492**	0.032
		z	2.09	0.23
Intangible	?	**Coef.**	-0.600***	0.037
		z	-2.61	0.12
Constant	?	**Coef.**	-5.097***	-7.578***
		z	-5.86	-6.64
No. of Obs.			626	627
Pseudo R^2			0.0505	0.1485
LR Chi^2			43.12***	101.42***

Panel B Consistency of Auditor Selection

		Predicted Choice					
		Small Clients			Large Clients		
		Big 4	Non-Big 4	Total	Big 4	Non-Big 4	Total
Actual Choice	Big 4	106	161	267	462	18	480
	Non-Big 4	78	281	359	133	14	147
	Total	184	442	626	595	32	627

	Small Clients	Large Clients
% Total Correctly Classified	61.82%	75.92%
% Correctly Classified in Big 4 group	39.70%	96.25%
% Correctly Classified in non-Big 4 group	78.27%	9.52%
% Using Big 4	42.65%	76.56%

* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

Panel A presents the probit regression results for the Big 4 choice model:

$$Big_i = \beta_1 + \beta_2 LnTA_i + + \beta_2 LnSub_i + \beta_3 DE_i + \beta_4 Quick_i + \beta_5 Foreign_i + \beta_6 CATA_i + \beta_7 ROI_i \beta_8 Loss_i + \beta_9 Intangible_i + e_i$$

where:

Big	= 1 if firm i chose a Big 4 auditor, 0 otherwise,
LnTA	= natural log of client total assets,
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets.

Panel B provides the distribution of auditor engagements that are consistent with the choice model prediction and those are not. Audit firm classification is based upon the prediction to choose a Big 4 (non-Big 4) auditor if the estimated probability from the probit model is greater (less) than 0.5.

Table 11 OLS Audit Fee Regression for Small and Large Client Segments (Using Big Dummy Variable)

Large clients have total assets greater than sample median (≥$19,601,990)

Panel A: Audit Fee Regressions

			Small Clients			Large Clients		
Model Columns			**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Expected Sign			***Total***	***Non-Big 4***	***Big 4***	***Total***	***Non-Big 4***	***Big 4***
LnTA	+	**Coef.**	0.221 ***	0.205 ***	0.268 ***	0.381 ***	0.386 ***	0.384 ***
		t	9.45	6.52	7.47	19.26	5.94	17.88
LnSUB	+	**Coef.**	0.247 ***	0.279 ***	0.196 ***	0.373 ***	0.365 ***	0.374 ***
		t	7.73	6.07	4.49	15.07	6.17	13.43
DE	+	**Coef.**	-0.003	0.005	0.006	0.214 *	0.375	0.195
		t	-0.39	0.34	0.67	1.68	1.06	1.40
Quick	-	**Coef.**	-0.007 ***	-0.007 ***	-0.008 ***	-0.003 **	-0.002	-0.003 **
		t	-7.65	-5.49	-5.40	-2.46	-0.82	-2.31
Foreign	+	**Coef.**	0.351 ***	0.326 **	0.383 ***	0.640 ***	0.611 ***	0.641 ***
		t	3.38	2.20	2.67	6.21	2.83	5.32
CATA	+	**Coef.**	0.705 ***	0.680 ***	0.704 ***	0.926 ***	0.837 ***	0.967 ***
		t	7.75	5.19	5.63	8.69	3.80	7.76
ROI	?	**Coef.**	0.000	-0.002	0.004 **	-0.016	-0.001	0.011
		t	0.33	-1.10	2.12	-0.15	0.00	0.09
Loss	?	**Coef.**	-0.060	-0.144	0.058	0.025	-0.015	0.041
		t	-0.55	-0.98	0.35	0.42	-0.12	0.60
Opinion	+	**Coef.**	0.254 ***	0.238 ***	0.260 ***	-0.020	-0.118	0.058
		t	4.44	3.11	2.99	-0.19	-0.68	0.41
YE	-	**Coef.**	-0.057	-0.132	0.031	0.120 *	0.090	0.129 *
		t	-0.70	-1.18	0.27	1.85	0.57	1.78
Intangible	+	**Coef.**	0.159	-0.023	0.492 ***	0.603 ***	0.519 *	0.633 ***
		t	1.47	-0.16	2.97	4.28	1.80	3.85
Big	+	**Coef.**	0.429 ***			0.281 ***		
		t	8.32			4.32		
Constant	?	**Coef.**	5.936 ***	6.271 ***	5.531 ***	2.871 ***	2.862 **	3.077 ***
		t	14.93	11.75	8.89	8.02	2.40	7.64
No. of Obs.			626	359	267	627	147	480
R^2			0.4282	0.3426	0.4444	0.7756	0.5091	0.7807
Adj. R^2			0.4170	0.3218	0.4204	0.7712	0.4691	0.7755
F Test			38.25 ***	15.70 ***	17.43 ***	176.80 ***	12.73 ***	151.45 ***

Panel B: Wald test for Differences in Slope Coefficients between Big 4 and Non-Big 4

		Small Clients	Large Clients
Differences in Slope Coefficients:	**Chi^2**	84.46	8.66
	P <	0.0000	0.6536

* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed)..

Panel A presents the OLS audit fee regression with an inclusion of Big 4 dummy variable, and audit fee regression estimations for Big 4 and non-big 4 auditee groups, respectively.
The OLS regression estimated is:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} YE_i + \beta_{11} Intangible_i + \beta_{12} Big + u_i$$

Big 4 and non-Big 4 audit fee regression estimated is:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} YE_i + \beta_{11} Intangible_i + v_i$$

where:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets ($000),
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets,
Big	= 1 if firm i is audited by Big 4, 0 otherwise.

Panel B reports results of a Wald test of equality for all slope coefficients (with the exception of intercept) across Big 4 and non-Big 4 auditors.

Table 12 Heckman's two-step regression with control for self-selection bias for small and large client segments (Large clients have total assets greater than sample median (≥ $19,601,990))

Panel A Audit Fee Regressions for Big 4 and Non-Big 4 Auditors

			Small Clients		Large Clients	
	Expected Sign		*Non-Big 4*	*Big 4*	*Non-Big 4*	*Big 4*
No. of Obs.			359	267	147	480
LnTA	+	Coef.	-0.026	-0.042	0.198	0.406***
		z	-0.07	-0.05	0.18	9.98
LnSUB	+	Coef.	0.292***	0.218*	0.380***	0.373***
		z	3.05	1.82	3.50	13.37
DE	+	Coef.	-0.032	-0.037	0.347	0.202
		z	-0.54	-0.32	0.87	1.45
Quick	-	Coef.	-0.003	-0.004	-0.003	-0.003**
		z	-0.65	-0.41	-0.77	-2.23
Foreign	+	Coef.	0.513	0.611	0.417	0.668***
		z	1.26	0.89	0.35	5.25
CATA	+	Coef.	0.172	0.090	0.779*	0.965***
		z	0.22	0.06	1.85	7.76
ROI	?	Coef.	-0.004	0.000	0.278	-0.032
		z	-0.80	0.02	0.16	-0.23
Loss	?	Coef.	-0.553	-0.470	-0.029	0.033
		z	-0.82	-0.33	-0.18	0.48
Opinion	+	Coef.	0.242**	0.262*	-0.120	0.055
		z	1.97	1.76	-0.72	0.39
YE	-	Coef.	-0.147	0.027	0.088	0.130*
		z	-0.84	0.14	0.58	1.81
Intangible	+	Coef.	0.488	1.164	0.501	0.640***
		z	0.61	0.65	1.55	3.90
Constant	?	Coef.	9.220**	12.427	5.633	2.578***
		z	2.06	0.69	0.34	2.95
λ_1	?	Coef.		-1.648		0.196
		z		-0.39		0.65
λ_0	?	Coef.	-1.555		-0.571	
		z	-0.70		-0.17	
Wald Chi^2			73.95***	72.96***	155.00***	792.59***

Panel B: Wald test for Differences in Slope Coefficients between Big 4 and Non-Big 4

		Small Clients	Large Clients
Differences in Slope Coefficients:	**Chi^2**	19.32	8.81
	P <	0.0555	0.6391

* (**, ***) is denotes for significant at 10% (5%, and 1%) level (2-tailed).

Panel A reports estimates from the following regression:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + \beta_{13} \lambda_i + u_i$$

where:

LnAf	= natural log of client audit fees,
LnTA	= natural log of client total assets ($000),
LnSub	= natural log of the number of client's subsidiaries,
DE	= ratio of client long-term debt to total assets,
Quick	= ratio of client current assets (less inventories) to current liabilities,
Foreign	= proportion of clients' subsidiaries that are foreign,
CATA	= ratio of client current assets to total assets,
ROI	= ratio of client earnings before tax to total assets,
Loss	= 1 if client has a loss in past three years, 0 otherwise,
Opinion	= 1 if client receives a qualified opinion, 0 otherwise,
YE	= 1 if client has a non-June 30th year end, 0 otherwise,
Intangible	= ratio of client intangible assets to total assets,
λ	= inverse-Mills ratio.

Panel B reports the results of Wald tests of equality of all slope coefficients (with the exception of intercept) across Big 4 and non-Big 4 auditors.

Table 13 Treatment Effects of Auditors Choice in Small Client Segment (Small clients have total assets less than the sample median (< $19,601,990))

Panel A Treatment Effects of Big 4 Auditors

	Mean Value Difference in Fees [a]	t-statistic
All Firms		
Actual Fee - E (Alt. Fee)	0.426	11.96***
Firms Making Predicted Choice		
Actual Fee - E (Alt. Fee)	0.475	8.98***
Firms Making Unpredicted Choice		
Actual Fee - E (Alt. Fee)	0.395	8.26***

Panel B Treatment Effects of Non-Big 4 Auditors

	Mean Value Difference in Fees	t-statistic
All Firms		
Actual Fee - E (Alt. Fee)	-0.419	-11.80***
Firms Making Predicted Choice		
Actual Fee - E (Alt. Fee)	-0.429	-10.19***
Firms Making Unpredicted Choice		
Actual Fee - E (Alt. Fee)	-0.385	-6.21***

a Differences are taken on the natural logs.
* (**, ***) Significant at the .10 (0.05, 0.01) level (2-tailed).

The treatment effect is measured for clients as the difference between the fees that would have been paid if they selected an alternative auditor type and the actual fees paid by them.
E (Alt. Fee) is computed by multiplying model parameters, estimated for one sample group such as Big 4 (non-Big 4), with measures of explanatory variables for auditees in the other sample groups - non-Big 4 (Big 4). The audit fee model used to estimate the parameters is:

$$LnAF_i = \beta_1 + \beta_2 LnTA_i + \beta_3 LnSub_i + \beta_4 DE_i + \beta_5 Quick_i + \beta_6 Foreign_i + \beta_7 CATA_i + \beta_8 ROI_i + \beta_9 Loss_i + \beta_{10} Opinion_i + \beta_{11} YE_i + \beta_{12} Intangible_i + v_i$$

where the variables are defined in Table 6.
Panel A reports treatment effects for Big 4 auditees, The treatment effect is reported for all the Big 4 clients first, then for firms consistent and inconsistent with auditor choice model classification respectively. The firm is predicted to choose a Big 4 (non-Big 4) auditor if the estimated probability from the probit model is greater (less) than 0.5.
Panel B reports the same treatment effect results but for non-Big 4 auditees.